DT-4000ZC DATA LOGGER

USER MANUAL

With the high technology of the integrated Σ-Δ converter, Data Logger provides the high accurate way on the data testing and data logging which can conveniently change the ACV, DCV, ACA, DCA, Resistant, Capacitance, Frequency, Temperature, etc. to the digital signals for computer. With the highly insulated optical RS-232 connector, you can transfer the records to the computer for further processions.

The Data Logger can automatically test and adjust the suitable values on each range accordingly. During the voltage, resistance and current testing, it can also be set to test a specified range by the push buttons.

The Data Logger can easily test and log the data on the voltages from 0.1mv to 600V, resistance from 0.1Ω to 40MΩ, currents from 10μA to 10A, capacitance from 10pF to 100μF, frequencies from 1Hz to 10M Hz, temperatures from –50°C to 750°C.

Not all the data transferred to the computer can be viewed on the digital and analogue ways, but can also be recorded, saved, automatically graphed and then processed and printed.

As it has the advantages of - the best in function, flexible and convenient in usage as well as cheap in price, it can be widely used in different fields. Not only greatly used in industrial test, scientific research, environmental protecting fields, it's also suitable for university and middle school students or families for scientific testing, data processing and analyzing. If accessed with some periphery circuit or induction blocks, it can also be a changeable data logging and analyzing system on the station.

Without connecting to the computer, this model can also be used separately as a multimeter.

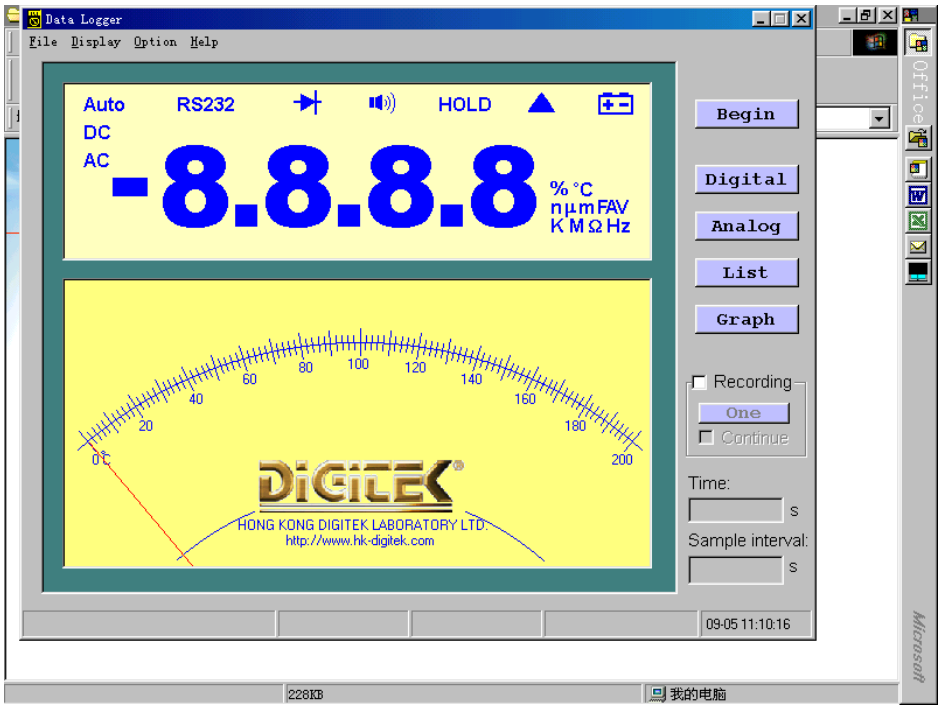
I. Installing the system

1. About RS-232 Connector

The RS-232 on DMM is connected with the optical isolated connector for high isolation between the DMM and computer. For safety, the attached RS-232 connector is required for the connection.

2. Installing the software

Open the **‘Setup’** file in Win95 or other Windows versions, select the right version for your computer and open the file. Double click **“Setup”** and then follow the instructions for the installation. After the installation, go to ‘**Program’** on the Start menu and enter the ‘Data Logger’ software. Then the following screen will appear:



(Fig. 1)

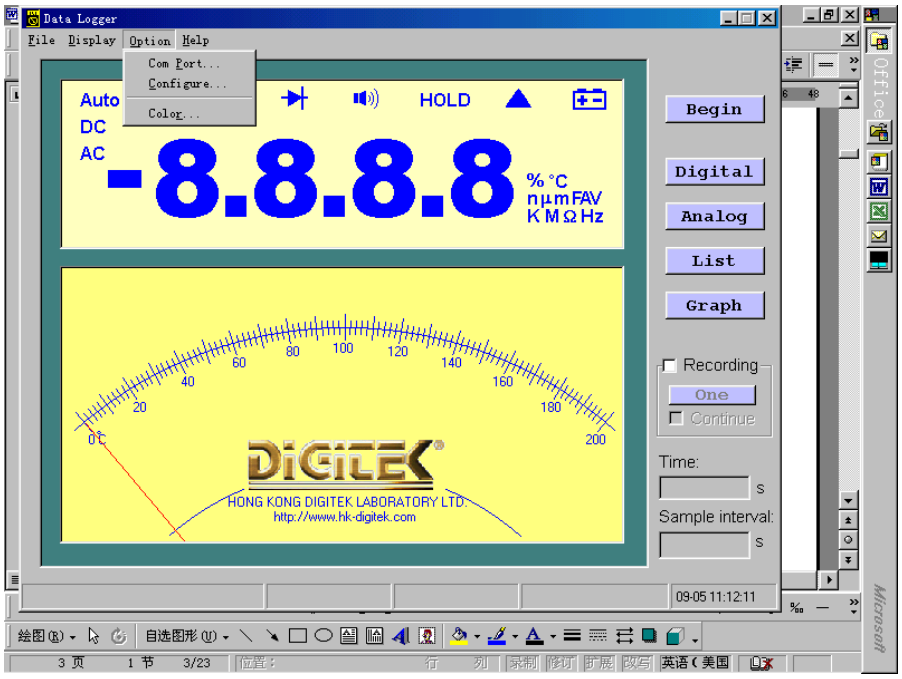
3. Use of the system

After installing the attached software and connecting the DMM to the computer with the RS-232 connector, start the computer and the DMM. Then start the RS-232 function on the Data Logger until the "**RS-232**" display appears on the screen. Select the " **Data Logger** " software after starting the computer. Push the "**Begin**" button on the right upper side and go into the measuring status with the connections. Then the "**Begin**" button has been changed to "**Stop**". And later you can also turn it off by pushing the "**Stop**" button.

If the operation is abnormal, please check the cable connection and refer to the description at **"Option".**

II. About “Option”

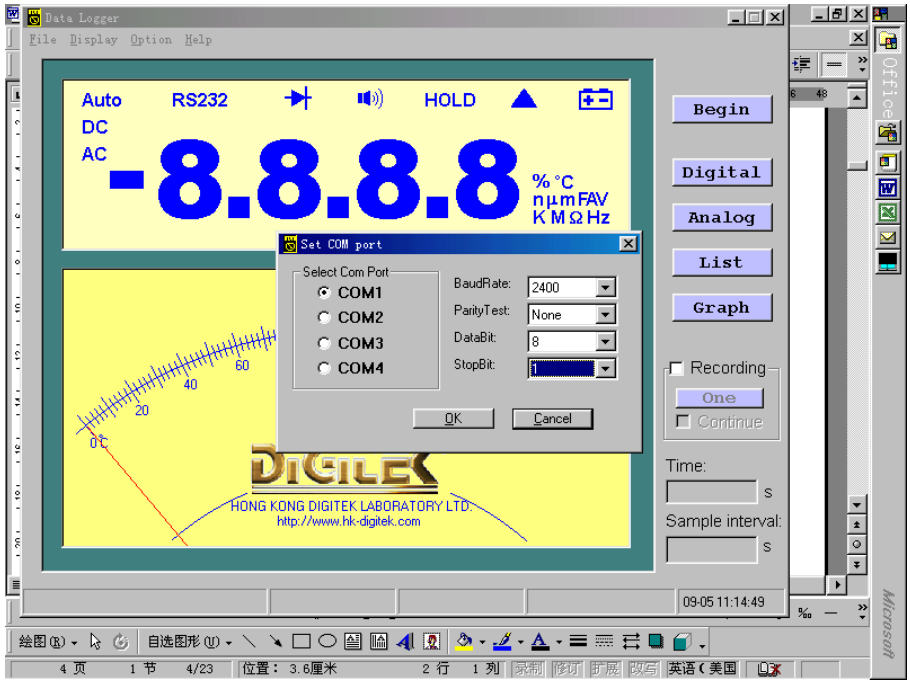
In the pulling box menu under the **“option”** item, you can finish the following selections:



(Fig. 2)

1. Setting “Com port”

Used in the selected computer connector for the speed transferring. According to the specification of the connected cable, the preset COM1 and Baud rate (2400) should be selected generally.

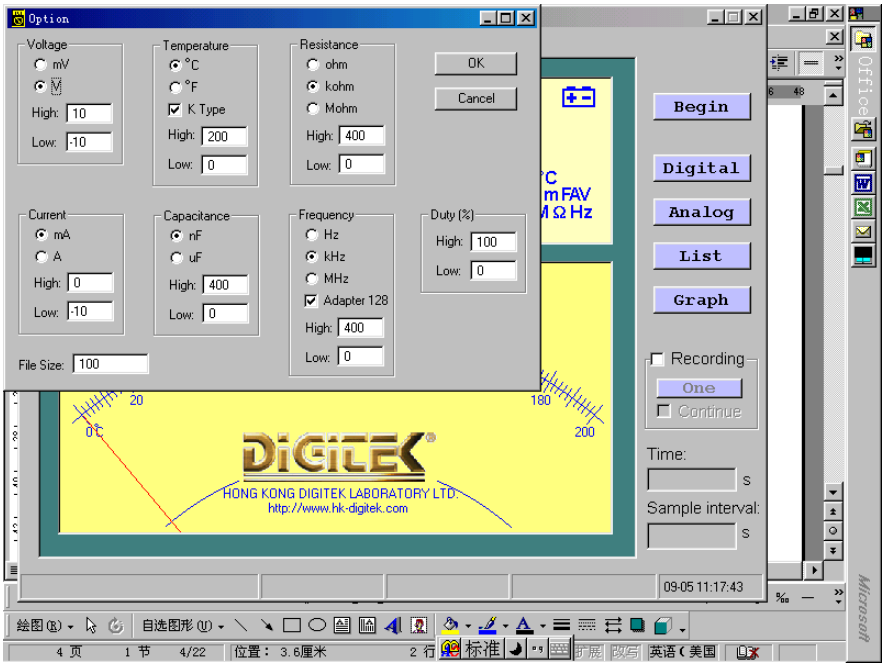


(Fig. 3)

2. Setting “Configure”

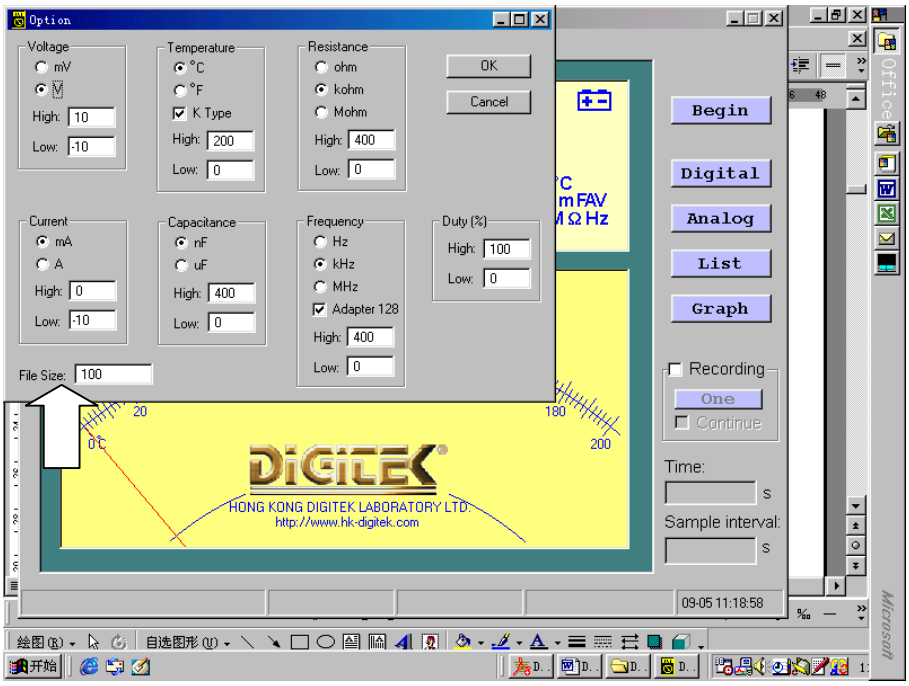
Select **“Configure”**, you’ll enter the windows for the parametric values setting.

(see Fig. 4)



(Fig. 4)

a. File Size: You can change the figures on the selected windows. It's for selecting the length for each recorded file which means how many lines of data should be included in a file.

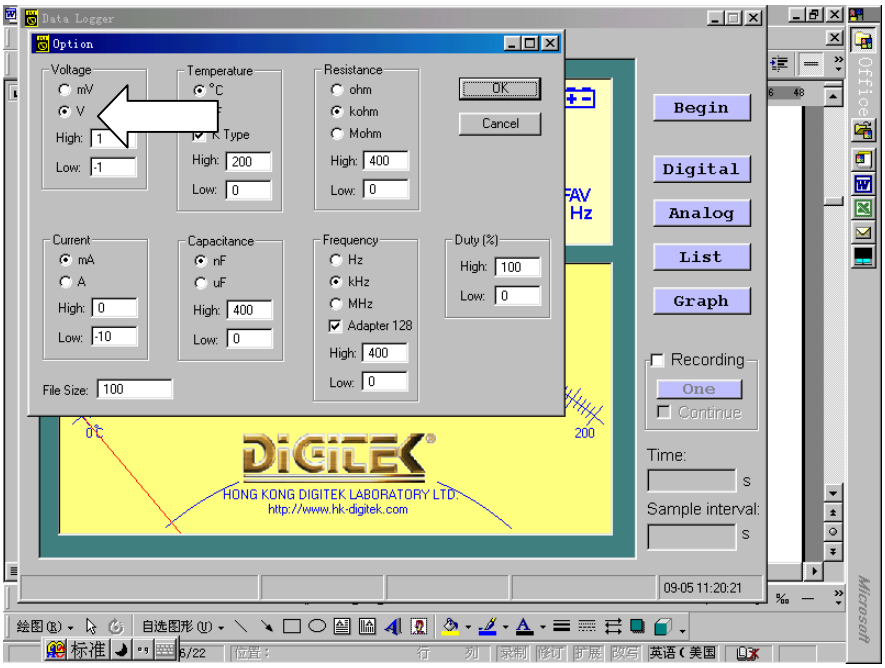


(Fig. 5)

b. The unit for each parameter in the recording can be selected inside the parametric column accordingly. And it should be standardized in the recording no matter what unit it displays in the digital LCD or analogue part.

e.g. In Fig. 6, the arrow points to “**V**”, which means the unit is Volt (**V**) in the voltage measuring. As the same in Fig. 6, the recording unit is set to “**k ohm**” for the Resistance measuring, “**nF**” for the Capacitance and “**mA**” for the Current, etc.

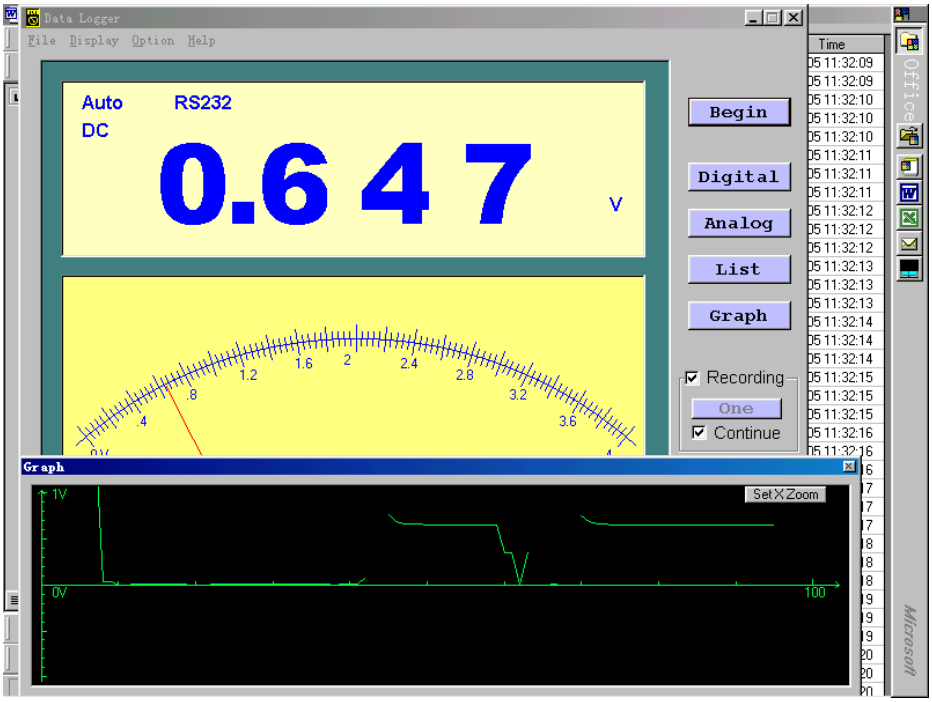
If you want to change the unit in the recorded data, you should choose by pointing to another unit in the range accordingly. And then click “**OK**” to confirm.



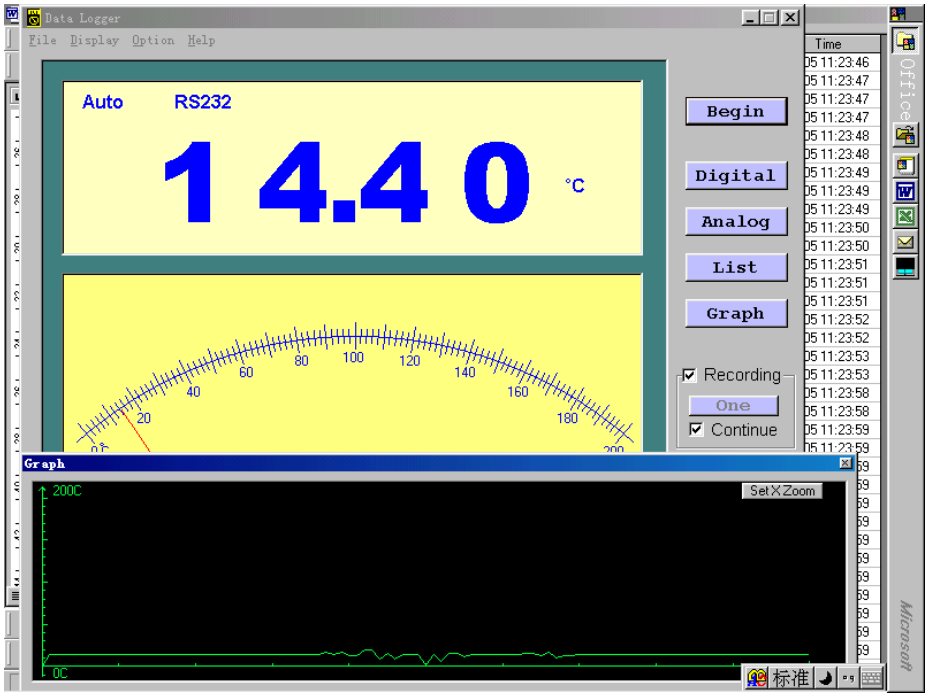
(Fig. 6)

c. The range of the ordinate for “**Graph**” can be selected by choosing the figures inside the long column of each parameter. E.g. (in Fig. 6) the setting has fixed the range for the ordinate of the graph from (–1V) to (+1V). See Fig7.

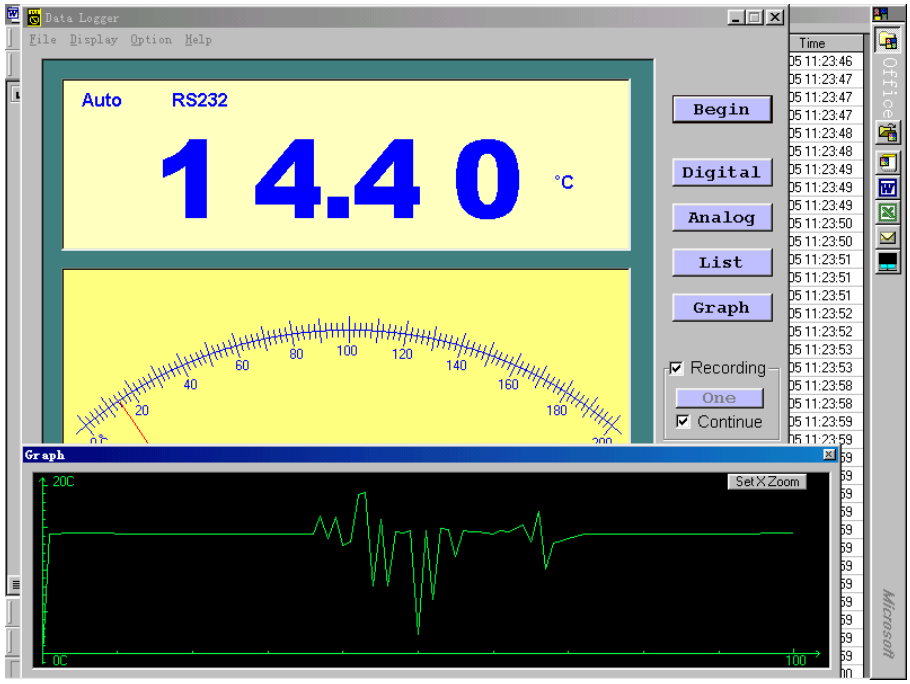
With this function, you can zoom the graph and view the minor changes of the records. E.g. When you’re checking the changes of the temperature under the previous fixed control, it looks like a straight line because the ordinate range is 0~200°C (see Fig. 8). But if we change the temperature range to 10~25°C in Fig. 6, the graph and the detailed changes of the temperature can be viewed clearly. (See Fig. 9)


Data Logger
File Display Option Help
Auto
RS232
DC
0.6 4 7
V
Begin
Digital
Analog
List
Graph
Recording
One
Continue
Time
Graph
1V
0V
Set X Zoom
100

(Fig. 7)


Data Logger
File Display Option Help
Auto
RS232
1 4.4 0
°C
Begin
Digital
Analog
List
Graph
Recording
One
Continue
Time
Graph
200C
0C
Set X Zoom

(Fig. 8)



(Fig. 9)

The data that has already been recorded and saved in the file can also be viewed in the software by changing the range of the ordinate for a clear and specific graph as per your required.

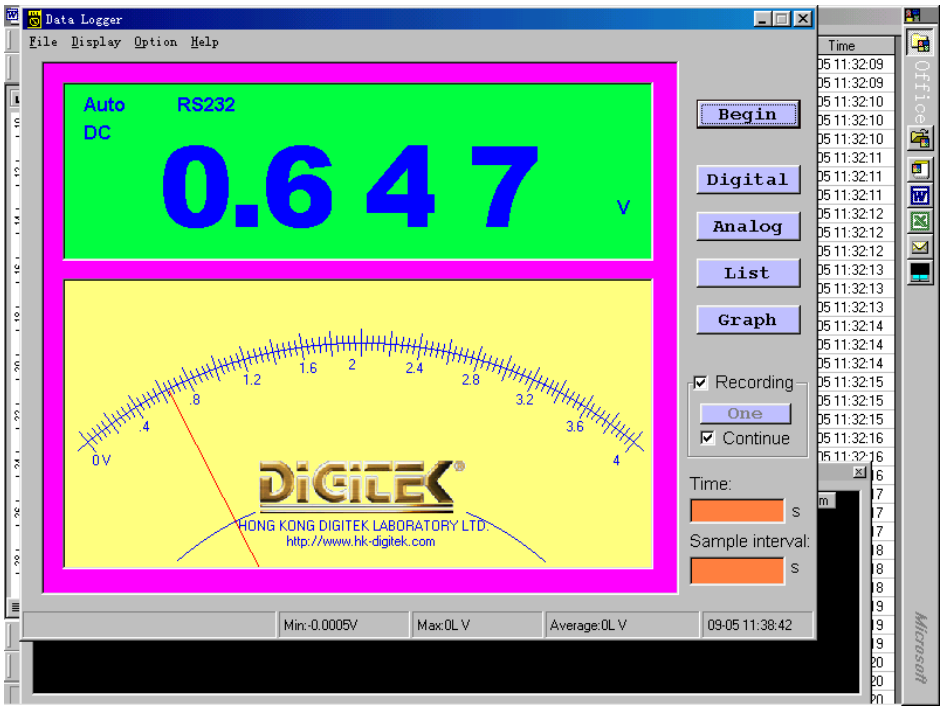
d. In the temperature measuring, Fahrenheit and Centigrade can be exchanged during the temperature measuring by selecting" **°C**" or" **°F**".

e. In the temperature test, select "**K Type**" and the calibrating function is activated for the nonlinear K type thermocouple. It can automatically calibrate the readings on the display and the records according to the standard of the K Type thermocouple so the accuracy of the temperature measuring can be greatly improved. Now the reading in the computer is different from the one on the Data Logger. But it's more accurate !

f. In the Frequency measuring, after connecting with the Adapter for the 128 pre-division, you can choose the "**Adapter 128**" button so the correct reading can appear and be recorded automatically without the calculation by yourself.

3. Setting "Color"

The color of the letters and drawings on the screen of the computer can be set to whatever color you like. You can make the display a colorful and unique one of your own.



(Fig. 10)

III. About "Display"

After the installation of the software and entering into the operation environment, you'll see four windows - **Digital**, **Analog**, **List** and **Graph** on the screen of the computer except the main window. On the bottom of the main window, there are four kinds of data displaying automatically: t**he Max.**, **Min.** and **the average values** as well as **the air time**. Therefore, there should be max. eight kinds of different data displaying at the same time.

You can also select the switch of the four windows by clicking the pull-down menu under the **"Display"** column: And you can randomly open/close the windows by clicking the four buttons on your right hand side.

IV. About "MAX., MIN., and AVG values"

1. During the real time sampling, the software will automatically continue calculating and displaying the Min., Max., and Average values.

2. The Min., Max. and Average values will be automatically calculated and display when you read the previous records in the software.

3. The calculation of the Min., Max. and Average values will be re-started if you double-click the left side button of the left-hand mouse in the operation

bar.

V. About Recording

1. After choosing “**Recording**”, the results of the test can be recorded;

2. The recording can be proceeded no matter the “**List**” or “**Graph**” button has been clicked or not;

3. When the recordings reach the length as preset in the file, they’ll be saved temporally under the name of “**Data.*** ” And then the next recording comes on the analogy of this.

4. When go on choosing “**Continuous**”, you’ll enter the automatically timed recording environment. You can select the total time for the recording by clicking the “**Time**” column. And the “**Sample interval**” provides the selection of the time gap between the two recordings. The system will automatically make it the way for long time recording and receiving the records continuously.

5. After choosing “**Recording**”, but without pressing on the “**Continuous**”, the recording is in the manual state. You can also have it for just one record by clicking the “**One**” button.

VI. About the saving of the long lasting records

The files that automatically and temporally saved under the name of **“Data.*”**will be cleared if you click the **“Begin”** button and enter into another working environment after clicking the **“Stop”** button.

If you want to save the temporal files for long-tem uses, you can select **“Save Data File”** in the **“File”** column after clicking the **“Stop”** button. Then click **“Save”** after inputting the name for the file. Now the file has been saved in your “**Data**” folder.

VII. About the viewing and printing of the saved file

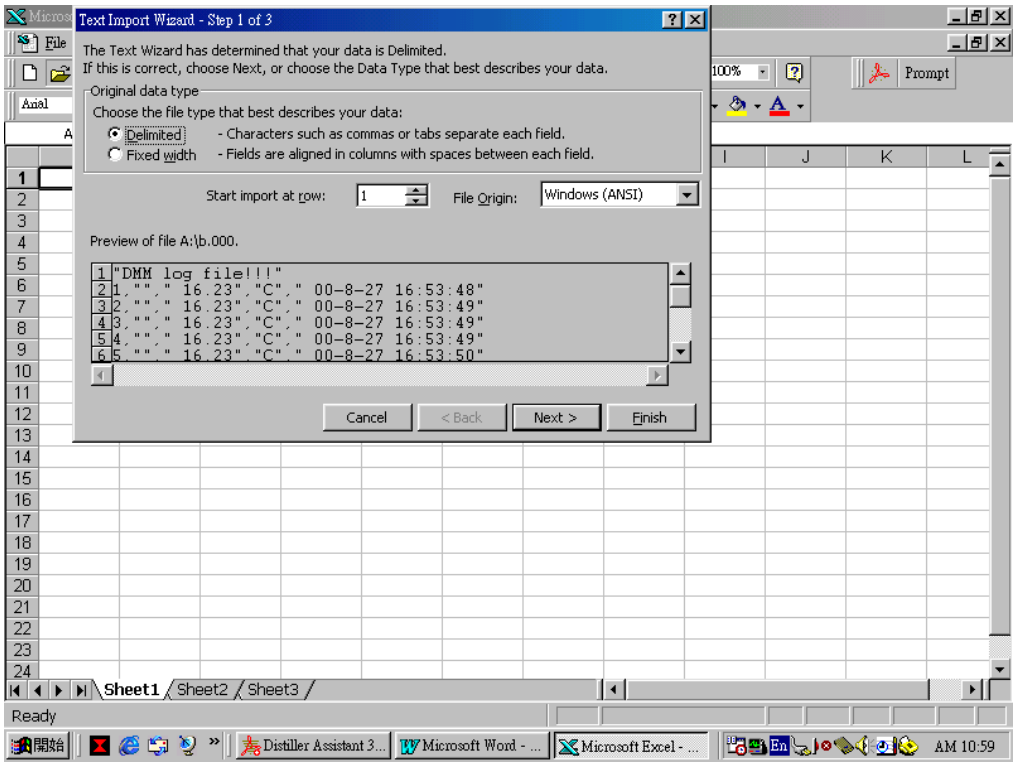
The files saved in the **“Data”** folder can be viewed in both **“List”** and

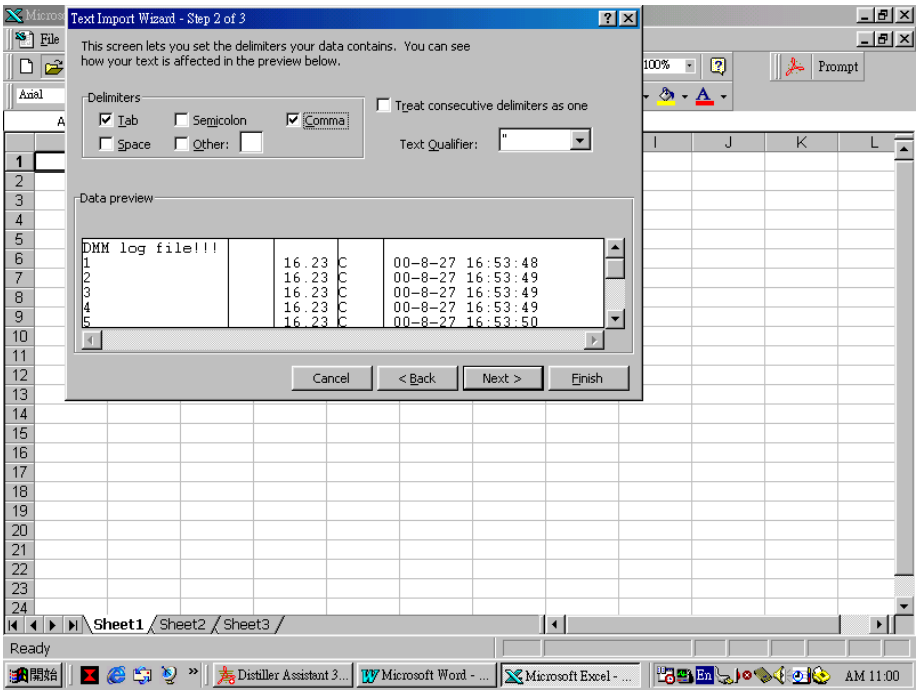
“Graph”. After clicking the **“Stop”** button, select **“Open Data File”** in the **“File”** column and select the file name you want. Click **“Open”** and you can view the file in the **“Data”** folder. All the data including the recording date and time can be displayed in **“List”** column. And in **“Graph”** you can view the diagram formed by the recorded data. In **“Configure”**, you can change the ordinate by selecting the figures in the long bar inside the relevant parameter. And the data points of the ordinate can be adjusted in **“Set X Zoom”** which is on the right-hand side in **“Graph”** column. Then a clear drawing can be displayed.

Select **“Print”** in the **“File”** column, and select **“List”** or **“Graph”**, then the displays in **“List”** or **“Graph”** can be printed.

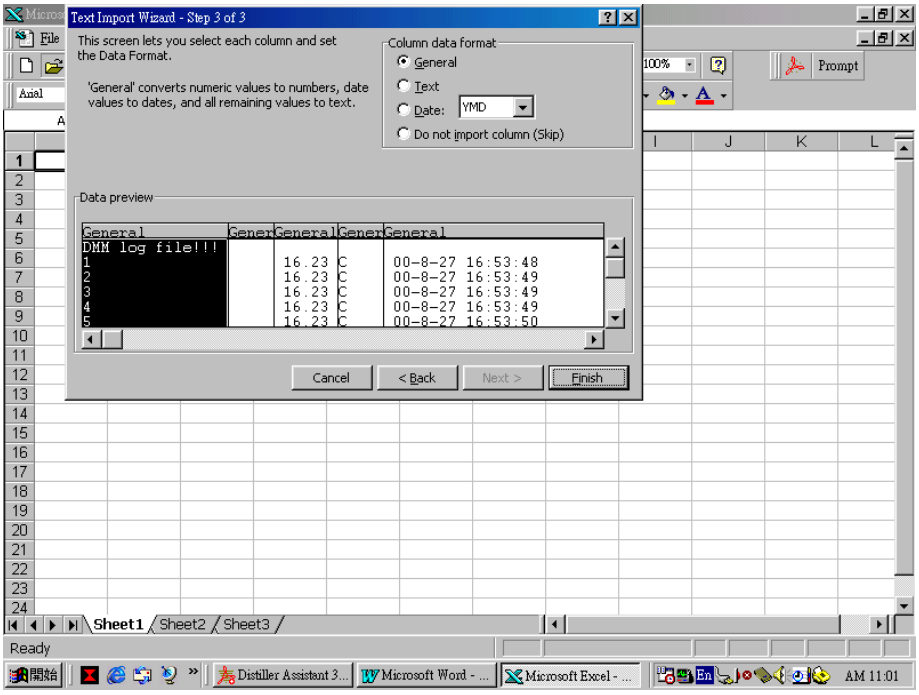
VIII. About further processing the saved data files in Excel

You can further process the saved files in Excel. After Starting Excel, choose “**All files**” and read the files saved in the “**Data**” folder. Separate the testing value, unit symbol, date and time under the instruction of Excel. And then you can do the analyzing and make your graphics in Excel. (See Fig. 11 to 14)


Text Import Wizard - Step 1 of 3
The Text Wizard has determined that your data is Delimited.
If this is correct, choose Next, or choose the Data Type that best describes your data.
Original data type
Choose the file type that best describes your data:
Delimited - Characters such as commas or tabs separate each field.
Fixed width - Fields are aligned in columns with spaces between each field.
Start import at row: 1
File Origin: Windows (ANSI)
Preview of file A:\b.000.
1 "DMM log file!!!"
2 1,""," 16.23","C"," 00-8-27 16:53:48"
3 2,""," 16.23","C"," 00-8-27 16:53:49"
4 3,""," 16.23","C"," 00-8-27 16:53:49"
5 4,""," 16.23","C"," 00-8-27 16:53:49"
6 5,""," 16.23","C"," 00-8-27 16:53:50"
Cancel
< Back
Next >
Finish
Sheet1
Sheet2
Sheet3
Ready
Distiller Assistant 3...
Microsoft Word - ...
Microsoft Excel - ...
AM 10:59
(Fig. 11)



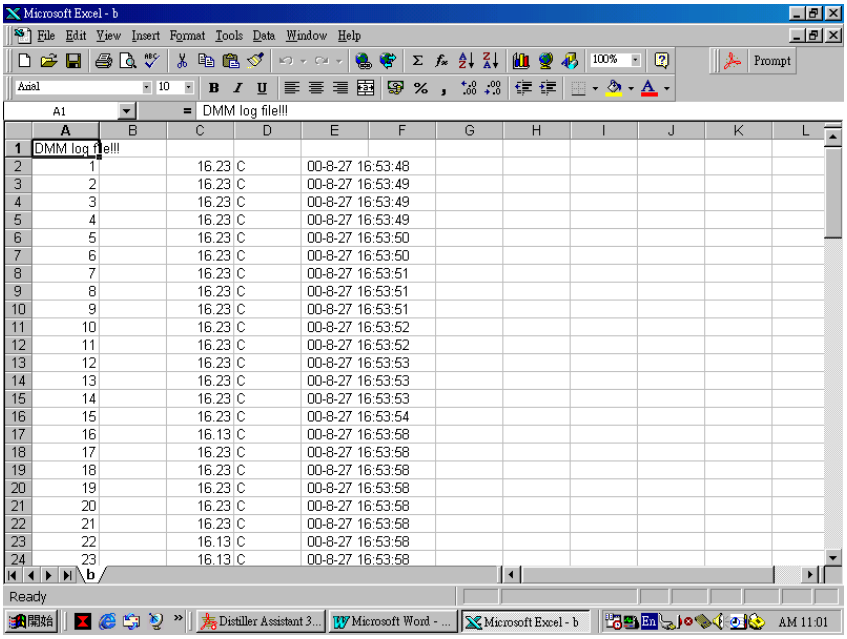
(Fig. 12)



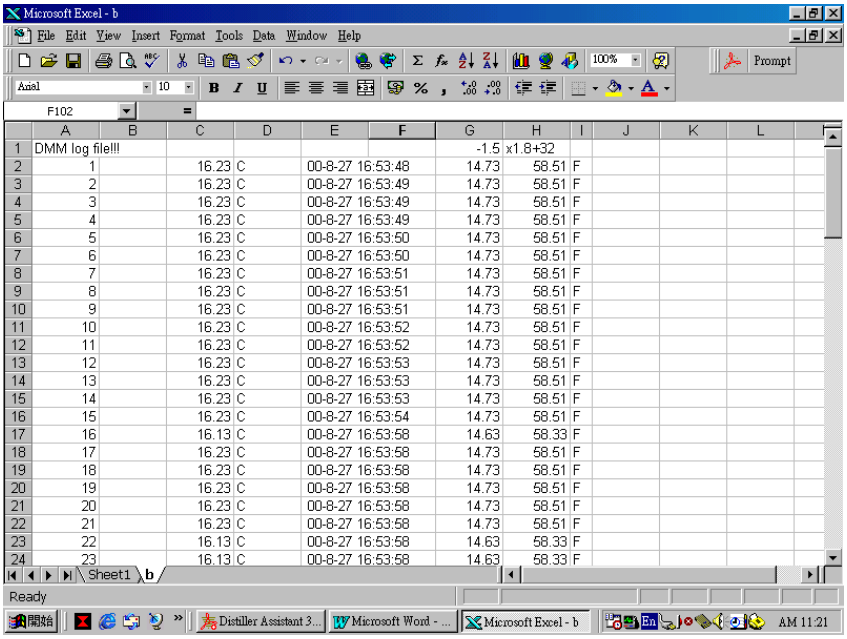
(Fig. 13)

In Fig. 14, we can make our further procession on the data. E.g. For the temperature data recorded in the list, we need to correct them and change them into Fahrenheit. If we've already known the error of +1.5°C caused by the internal temperature of the Data Logger and need to be deducted, like in

Fig. 15, we can deduct 1.5 from all the data in column C, and then put them in



(Fig. 14)



(Fig. 15)

column G for the correct Centigrade temperature. Then according to the exchange of the Centigrade to Fahrenheit, make all the data in Column G times 1.8 and add 32, and then put the results in Column H, and put the symbol of “°F” in Column I for the Fahrenheit. Now the process is completed easily.

IX. About the Auto Power Off Function in the Data Logger

As the Data Logger has the auto power off function, the Data Logger will automatically power off and get into the shutting down environment in 30 minutes after you stop turning the rotary switch or pressing the button. But if a long time recording is required, you can press "**Select**" (or the "**SEL**" button) when you turn on the power of the Data Logger. Then the auto power off function is eliminated.

X. Specifications

1. General specifications

Testing method: Σ-Δ

Display : LCD

Ranges: Manual or auto-ranged

Polarity: Automatic

Overload indication: "OL" display

Battery indication: When the battery is lower than 2.4V, a "🔋" symbol will appear for reminding of replacing the battery.

Safety standards: CE EMC/LVD. IEC1010 Double Insulation CATII

.

Operation environment: Temperature 32°F to104°F (0°C to 40°C), humidity< 85% RH.

Storage environment : Temperature -4°Fto140°F (-20°C to 60°C), humidity< 95%RH.

Power source : 2 x 1.5V AA batteries.

Dimension : 145(H) x 73(W) x 40(D) mm

Weight : Approx. 350g (including battery and holster).

2. Electric function specifications

Accuracy is indicated with ±(% reading+ digits), environmental temperature 23±5°C, Humility < 75%

DCV:

400mV, 4V, 40V, 400V : ± (0.5% + 5)
600V : ± (0.8% + 5)
Input Impedance : 10MΩ(about 10GΩ at 400mV range)

ACV:

4V, 40V, 400V : ± (0.8% + 5)
400mV, 600V : ± (1.2% + 5)
Input Impedance : 10MΩ (about 10GΩ at 400mV range)
Frequency :40—400Hz

Resistance:

400Ω, 4kΩ, 40kΩ, 400kΩ, 4MΩ: ± (1% +5)
40MΩ : ± (2% +5)
Overload protection : 250V DC/AC RMS.

DCA:

40mA, 400mA : ± (1.5% +5)
10A : ± (2% +5)
Overload protection : Fast speed 0.5A/250V, 10A/250V fuses

ACA:

40mA, 400mA : ± (2% +5)
10A : ± (2.5 % +5)
Overload protection : Fast speed 0.5A/250V, 10A/250V fuses
Frequency :40—400Hz

Capacitance:

40nF : ± (3.5% +10)
400nF,4μF, 40μF : ± (3% +5)
100μF : ± (3.5% +5)
Overload protection : 250V DC/AC RMS.

Frequency and Duty cycle

Frequency 10Hz-10MHz : ± (0.1% +5)
Duty cycle 0.1%-99.9% : ± (2.5% +5)
Sensitivity : Sine wave 1.5V RMS. Max. input 50V
Overload protection : 250V DC/AC RMS.

Temperature: (For using “K” type thermocouple)

0°C--+40°C : ±3°C (internal temperature sensor)
-50°C--+200°C : ± 0.75%± 3°C
+200°C--+750°C : ± 1.5%± 3°C

Remarks: When it's connected to the computer with RS-232, there's an option for "K type" in the software which can start the nonlinear calibration program of the K type thermometer and adjust the nonlinear of the thermocouple to 0.5% downwards at the range of -250°C ~ +1300°C.

Diode testing:

Test current	: 1±0.6mA
Test voltage	: .Approx. 1.5V
Overload protection	: 250V DC/AC RMS

Continuity testing

There's a beeper when the resistance is less than (60+20)Ω in the tested circuit.

Overload protection: 250V DC/AC RMS.

XI. Operation

Note: Correct operation on this instrument can ensure safety and avoid the unnecessary damage on the instrument.

1) Always make sure to select the suitable range and the correct test leads for the connection. Do not switch to Amp, Res, or Temp. range when measuring Voltages.
2) Be careful on the measurement of over 50V, esp. during the high voltage measurement.
3) Try to avoid the connection with the active circuits.
4) When the Amp. is being tested, make sure the tested circuit is in inactive while the test leads are connecting with the circuits.
5) Before making resistance measurements or diode test, make sure that the circuit under test is not energized. And the capacitance has been discharged and without high volts on it.
6) Always make sure that the correct function and range is selected. In the manual operation, if the correct range is not confirmed, the highest one is always recommended for the beginning.
7) When connect the Data Logger with a Current Converter, extreme care should be taken in order to avoid the high voltage caused by the disconnection.
8) Make sure that the test leads and sockets are in good condition with no damage to the insulation.
9) Take care not to exceed the over-load limits as given in the specifications.
10) Use the attached test leads and RS232 cable only.
11) Before opening the case of the instrument for battery replacing, disconnect with any external circuit.

12) Use the correct type of the fuse for the fuse replacement.

1. Check the battery.

If the battery is weak, a "▱" symbol will appear on the left side of the display. It means that the battery should be replaced.

2. DC and AC Voltage measurement

1) Connect the black test lead to "**COM**" socket and red test leads to the "**VΩmAHz**" socket.
2) Switch to the desired "**V ⏦**" position.
3) Press **"SELECT"** key to choose functions for ACV and DCV. When it's in ACV function, the "**AC**" symbol will appear on the LCD.
4) If a fixed voltage range is selected for measuring, the "**RANGE**" button should be pushed. And the symbol of "**AUTO**" will disappear which means that the manual ranging is activated. Continue pushing until the desired range appears.
5) Touch the tested source or the measuring point with the test probes. The readings will appear on both the screen of the computer and the LCD of the instrument.

3. ACA & DCA measurement

1) For the measurement of lower than 400mA, link the black test lead with the "**COM**" socket and red test leads with the "**VΩmAHz** " one.
2) Switch to"**mA ⏦** " or " **μA ⏦** ".
3) Press **"SELECT"** key to choose functions for ACA and DCA. When it's in ACA function, the "**AC**" symbol will appear on the LCD.
4) If a fixed current range is selected for measuring, the "**RANGE**" button should be pushed. And the symbol of "**AUTO**" will disappear which means that the manual-range is activated. Continue pushing until the desired range appears.
5) For current measurement from 400mA to 10A, connect the red test lead to the "**10A**" socket. Set the selector switch to "**A ⏦** " position, and press "**SELECT**" key to choose the functions.

4. Resistance 、Capacitance measurement and Diode, Continuity Test

1) Connect the black test lead to the "**COM**" socket and red test leads to the "**VΩmAHz**" socket.
2) Switch to "**Ω ▶| •))** " position.
3) Press "**SELECT**" key to choose functions for Resistance, Diode and Contiunity measuring.
4) In Capacitance measuring, switch to "⊣⊢ " position.push "**REL△**" first to eliminate the zero error. The tested Capacitor should have been

discharged in advance in order to avoid any high voltage on it.

5) Touch the two points of the tested circuit, Resistor, Capacitor or Diode by the test probes in the ranges accordingly.
6) If a fixed current range is selected for measuring, the "**RANGE**" button should be pushed（This Manual Range function not provide for Capacitance measuring）. And the symbol of "**AUTO**" will disappear which means that the manual-range is activated. Continue pushing until the desired range appears.

5. Frequency and Duty cycle measurement

1) Connect the black test lead to **"COM"** socket and red test leads to the **"VΩmAHz"** socket.
2) Switch to "**Hz**" position.
3) Press "**Hz/DUTY**" key to choose functions of Frequency or Duty cycle (%).
4) Contact the tested source with the probes. The readings will be displayed on both the screen of the computer and the LCD of the instrument. If the tested source is over 50V, it should be divided into the suitable size first.
5) There's only auto-ranged for the Frequency and Duty cycle measurements.

6. Relative value display

Pressing the "**REL△**" key, you'll enter the relative measurement status. The present values on the LCD will be stored in memory. The new display value is equaled to the measured result subtracting the stored value. (But such function does not exist in the Hz/Duty measurements.)

With this function, some the measuring problem can be easily solved without calculation.

Example:
When you test the capacitance, you can use the Relative function to eliminate the zero error.

7. Manual range and auto range

1) Default is set to be "Auto" range when the meter first turns on. Press "RANGE" key the meter enter the "Manual" mode. Each presses of "RANGE" key increments the range.
2) Hz/Duty and Capacity functions cannot be manually changed.
3) Press "RANGE" key more than 2 seconds, the meter changes back to "Auto".

8· Auto Power Off and disable

1) When the meter has been turned on 30 minutes without any action from the

users, the meter will automatically change to “OFF” mode.

2) To disable Auto Power Off function, press “SELECT” key when power on the meter.

9 · RS232

1) Please set up your PC under Windows95 or NT system. Insert the diskette to the drive. Click “Setup.exe” . Follow up setup massage from the screen.
2) Connect the RS232 cable between the meter’s and the computer’s serial ports. Move to your MOUSE to “PROGRAM” menu box, then “DMM” is shown. Please click “DMM” into use.
3) Push “RS232”, RS232 stats and the symbol of ” RS232” appears on the LCD.
   Push “RS232” again, RS232 is disconnected and the symbol of “RS232” disappears.

10. HOLD value on display

Pressing the “**HOLD**” key, you’ll HOLD the value on display and “ H ”. Will appear on the LCD. The new display value not be showed on the LCD until press the key “**HOLD**” again and the “ H ” disappear from the LCD (This “**HOLD**” function not provide for Hz measurement).

XII. CARE AND MAINTENANCE

1. Protect your Data Logger

Your Data Logger is a superior design and precision product of craftsmanship. The following suggestions will help you protect for it so you can enjoy it for years.

1) Keep it dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode electronic circuits.
2) Use and store the millimeter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.
3) Handle the millimeter gently and carefully. Dropping it can damage the circuit boards and case and can cause the millimeter to work improperly although the holster can provide enough protection.
4) Keep the instrument away from dust and dirt, which can cause premature wear of parts.
5) Wipe the instrument with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to for the cleaning.

2. Replacement

1) Replace the battery

a) Make sure the instrument is not connected with any external circuit. Set the selector switch to **OFF** position and remove the test leads from the terminals.

b) Remove the screw on the back case and lift the battery case.

c) Remove the old battery and replace it with a new battery of the same type.

2)Fuse replacement

a) Make sure the instrument is not connected with any external circuit. Set the selector switch to **OFF** position and remove the test leads from the terminals.

b) Release the screw on the back case and lift the battery case.

c) Remove the broken fuse and replace it with the same type. Relocate the back case and battery cover with the screw.

XIII. Accessories

The following items are included in the Data Logger:

1. Holster	1 pc
2. RS-232 cable connector	1 pc
3. AA battery	2 pcs (installed inside)
4. Test leads	1 pair (red & black each)
5. K type thermocouple	1 pc
6. CD Rom	1 pc